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VOICE OF THE ELECTRIC UTILITY INDUSTRY

FERC OKs Pacific merger

Utah PSC studies effect of wheeling conditions for UP&L

WASHINGTON—PacifiCorp's Pacific Power & Light Co. and Utah Power & Light Co. may have gotten over the final hurdles—including imposed wheeling guidelines—in their merger efforts.

Rehearings by the Utah Public Service Commission on Nov. 8-9 and Nov. 28-29 weren't expected to obstruct the merger. Utah state regulators previously approved the merger, but reserved the right to suspend that decision if federal regulators placed conditions on the deal. The Utah PSC suspended its approval, three hours after the FERC decision, to assess the merger effects on that state's interests.

Wheeling rules: not much effect

Stipulations in the Federal Energy Regulatory Commission's approval of the merger are estimated to reduce the profitability of the combination by $5 million over five years, said Chris Hunter of PacifiCorp. That "minimal effect" apparently was not enough to dissuade the utilities, and is not expected to change the minds of Utah regulators.

The combined utility promised to decrease Utah power rates by 2 percent in 60 days and a total of 5-10 percent in three to five years, Hunter said. With that promise, customers are guaranteed savings, and risk falls to management and shareholders. Anticipated savings from the merger were projected by the companies at $500 million over five years.

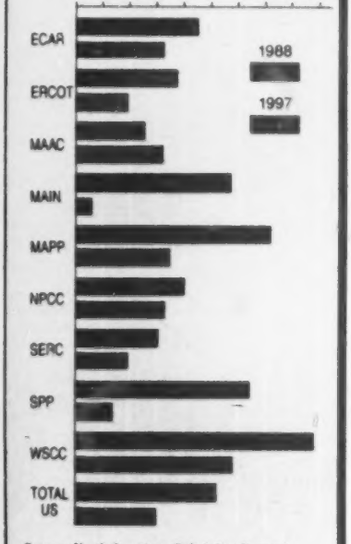
Under the merger agreement, UP&L stock would be converted into PacifiCorp stock at a value ranging from $32.25 to $38 per share, for a total transaction worth about $1.9 billion.

Continued on page 11

CAPACITY MARGINS

Capacity margins vary, but are projected to be "at risk" by 1997 in several NERC regions. Margins are based on generating capacity that exists, is under construction or is planned, plus scheduled purchases from other utility or nonutility generators, less any sales. A margin is the amount planned capacity exceeds projected peak demand. The percent margin shown is an area's margin divided by its total planned capacity (multiplied by 100).

The areas are: ECAR-East Central Area Reliability Coordination Agreement; ERCOT-Electric Reliability Council of Texas; MAAC-Mid-Atlantic Area Council; MAIN-Mid-America Interconnected Network; MAPP-Mid-Continent Area Power Pool; NPCC-Northeast Power Coordinating Council; SERC-Southeastern Electric Reliability Council; SPP-Southwest Power Pool; and WSCC-Western Systems Coordinating Council.



Source: North American Reliability Council

SDG&E and TEP break merger; SCEcorp is ready

Mark T. Hoske
Assistant Editor

SAN DIEGO—The engagement with TEP is off, and SCEcorp is still courting the utility next door.

San Diego Gas & Electric Co. split with Tucson Electric Power Co. over its disagreement about how to thwart SCEcorp's efforts to block their planned merger. The engagement lasted from June to November.

As of press time, SDG&E said it was examining other choices, including accepting SCEcorp's $2.4-billion unsolicited merger offer.

"Now that the Tucson Electric deal has been terminated, we need to carefully consider our alternatives. These include remaining independent, pursuing a possible combination with SCEcorp and other extraordinary transactions," explained Thomas A. Page, SDG&E chairman and chief executive officer.

A representative from SDG&E would not elaborate on any of those points.

SDG&E had previously turned down SCEcorp's beefed-up buyout offer after asking for an extension for more time to consider (*EL&P*, Oct., p.1). SDG&E argued that the benefits to merging with SCEcorp were short-term. After the offer was rejected, SCEcorp still left it open.

SCEcorp's efforts to block the TEP/SDG&E merger were expected to significantly complicate the regulatory process in the California and Arizona, as well as at the Federal Energy Regulatory Commission. These issues led the TEP and SDG&E boards to conclude that it was in the best interests of the respective companies and stockholders, employees, and customers to terminate the merger agreement.

Continued on page 6

LATE NEWS

Texas Utilities Electric Co. supplies Waxahachie, TX, a small town south of Dallas, and the planned site for the $4.4-billion superconducting supercollider.

With an anticipated peak demand of about 180 MW, the project is expected to generate annual revenues of about $50 million for TU and bring 3500 permanent jobs to the area. Don Raburn, director of investor relations, expects $50 million more from stimulus of the region's economy.

Debate over site selection and funding is expected, especially since the selection came just two days after Texan George Bush won. Part of the boost for Texas over six other finalists was a $1-billion incentive package of bonds and services. If Congress approves, construction could begin in 1990, with operation in 1997.

Duke Power cuts 1200 employees; preparing for 1990s

CHARLOTTE, NC—Duke Power Co. is trimming 1200 employees, about 6 percent of its workforce, the third utility to make major cuts in five months.

In recent months, Tennessee Valley Authority and Public Service New Mexico cut back by 20 percent. Arizona Public Service has also been streamlining.

Duke Power, on a strong financial footing, previously announced it might have to cut up to 10 percent of its people to avoid rate increases through the early 1990s.

Over two months, company managers were asked to carefully identify where cuts could be made in the 20,800-person workforce.

"This review has allowed us to identify ways we can better control costs and achieve rate stability for our customers," said Bill Lee, Duke Power chairman. That review is leading to the layoff or early retirement of about 1200.

About 350 are from the headquarters in Charlotte, about 500 from other

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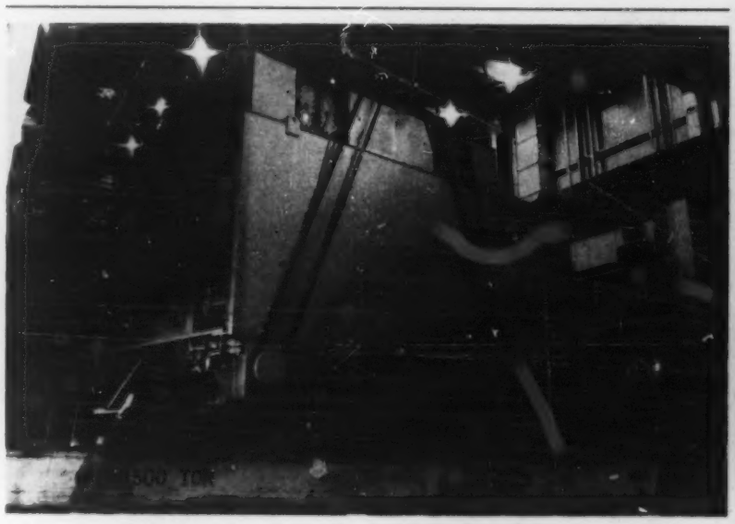

Air-cooled generator readied for testing

One of three General Electric Co., 6A3 advanced-design, air-cooled generators is loaded onto a railcar at the company's Schenectady, NY, test facility prior to undergoing engineering performance specification tests. It was shipped in mid-October to Exxon Chemical Co.'s Baystown, TX, plant as part of a GE MS6001 gas-turbine, packaged power plant. The two other 6A3 generators and turbines were shipped to the site in August and September. The three units will be used in a cogeneration plant to provide process steam and 100 MW of electric power to the Baystown plant. The cogeneration plant is expected to begin commercial operation by February 1989. The 6A3, a new version of GE's 6A2 generator, can produce 28-35 MW of electric power when used with a steam turbine or up to 38 MW when coupled to a gas turbine.

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News Briefs

JILL MINNER, Assistant Editor

NRECA and EPRI to cosponsor agricultural research program

The National Rural Electric Cooperative Association and the Electric Power Research Institute (EPRI) have teamed up to sponsor a technical research program for the agricultural sector. According to EPRI, the organizations will provide 'seed money' to universities for three years to stimulate basic research in using electricity-based technologies to benefit the nation's agriculture.

EPRI creates office, forms new division

In other news, the Electric Power Research Institute has created an Office of Corporate and Commercialization Development and has formed a consolidated Generation and Storage Division. EPRI said it formed the new division by merging its Advanced Power Systems (APS) and Coal Combustion Systems (CCS) divisions, as well as its Plant Electric Systems Rotating Machinery and Materials Support programs. Former CCS Director Kurt Yeager will head the Generation and Storage organization, according to EPRI. Dwain Spencer, who was previously director of the APS division, was named director of the new Office of Corporate and Commercialization Development.

C-E to acquire energy management business

Combustion Engineering, Inc. (C-E) recently announced its intent to acquire Systems Control, Inc.'s Energy Systems Group (ESG). ESG is a supplier of energy management systems, supervisory control and data acquisition systems, and advanced application software to the electric power industry. According to C-E, ESG will operate as part of its Utility and Industrial Controls business.

General Signal Corp. consolidates units

General Signal Corp. said it has merged three of its electrical equipment business units, Hevi-Duty Electric, Dowzer Electric and Nelson Electric, into one. The new company, Hevi-Duty Electric, will be headquartered in Goldsboro, NC. According to General Signal, the units were consolidated to better serve its primary electric utility and electrical distributor customers.

CIGRE calls for papers

The International Conference on Large High Voltage Electric Systems (CIGRE) announced a call for technical papers and films for its next biennial session in Paris, France in August 1990. According to CIGRE, abstracts not exceeding 500 words must be submitted before March 1, 1989. For more information contact: U.S. Technical Committee Chairman H.N. Scherer, Jr., c/o D.J. Rogier, American Electric Power Service Corp., One Riverside Plaza, Columbus, OH, 43215 or phone (614) 223-2289.

Gilbert, Halcrow form new joint venture firm

Gilbert Associates (Europe), Ltd. and Halcrow & Partners, Ltd. have formed a consulting engineering company, Halcrow Gilbert Associates (HGA). The joint venture will focus on the computer-based controls and telecommunications field, as well as support of power generation and offshore oil production needs. Headquartered in Swindon, Wiltshire, England, HGA said it plans to target selected market segments primarily in Europe, with future expansion into other international areas of mutual interest. Gilbert Associates (Europe) is a subsidiary of Gilbert/Commonwealth, Inc. which is helping to sponsor the joint venture.

Utilities fined by NRC

The Nuclear Regulatory Commission recently proposed the following fines:

Commonwealth Edison Co.
A $50,000 fine for one violation of NRC security requirements involving inattentive guards at the Braidwood nuclear plant.
A $125,000 fine for two violations of NRC safety requirements at the Quad Cities nuclear power station.

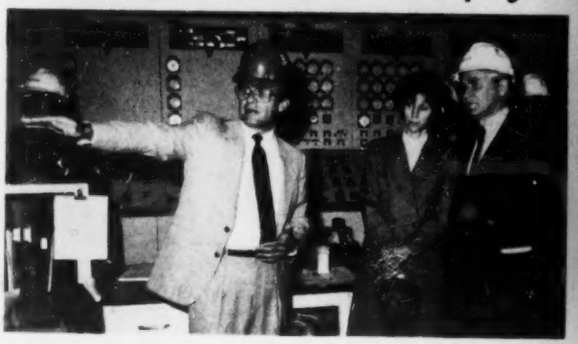
Consumers Power Co.
A $187,500 fine for failing to adequately test some electrical components at the Big Rock Point nuclear plant.

Omaha Pub. Power District
A $50,000 fine for alleged violations of NRC requirements in the operation of the Fort Calhoun nuclear plant.

PSNH restructures top management

In order to emphasize customer service and strengthen its bankruptcy reorganization efforts, Public Service of New Hampshire said it has appointed four senior vice presidents. John P. Edwards was named senior vice president-customer affairs; Charles E. Bayless will serve as senior vice president and chief financial officer; D. Pierre G. Cameron, Jr. was chosen as vice president and general counsel; and Ralph S. Johnson was appointed senior vice president responsible for PSNH's engineering function.

Soviet ambassador tours NYPA project



Yuri Dubinin, Soviet ambassador to the United States (right), recently toured New York Power Authority's Niagara Power Project during a visit to Niagara Falls. Ronald Ciamaga, superintendent of technical services at the project, explained the operation of the control room while NYPA Community Relations Manager Joanne Wilmott looked on.

NIRMA board selected

The Nuclear Information and Records Management Association has chosen its board of directors for the 1988-89 term. Hans Ebner, Jr. of Detroit Edison was named president; Tennessee Valley Authority's Karen Ledbetter was appointed vice president; treasurer is Michael Murphy of Public Service Electric & Gas Co.; and Thomas Reding of Northern States Power Co. was named secretary.

Promotions announced at Duke Power Co.

Duke Power Company recently announced the following promotions: Richard B. Priory to senior vice president-generation and information services; William A. Coley to senior vice president-power delivery; Theodore C. McMeekin to vice president-design engineering; Richard J. Osborne to vice president-finance; and Sue A. Becht to treasurer.

Starr receives medal, named to Hall of Fame

Electric Power Research Institute President Emeritus Chauncy Starr recently received the Rockwell Medal and was admitted to the world level Hall of Fame for Engineering, Science and Technology. According to EPRI, the Rockwell Medal recognizes Starr's contributions to the generation, transfer and application of technology for the betterment of mankind. Starr was vice chairman of EPRI from 1978 to 1988 following five years as the founding president. Before serving as Dean of UCLA's School of Engineering and Applied Science, Starr was vice president of Rockwell International and president of its Atomic International Division.

Energy innovation award winners selected

Seventy-four projects were chosen to receive National Awards for Energy Innovation as part of a government program to identify and recognize the best energy-saving ideas from each state. Energy Secretary John S. Herrington presented the awards to the winners who included school districts, private corporations, small businesses and local government, as well as individuals. They were selected from recommendations submitted by 36 states and the District of Columbia, according to DOE.

Asea Babcock to supply AEP with PFBC system

American Electric Power Co. plans to negotiate a contract with Asea Babcock for supply of a pressurized fluidized bed combustion system for its Sporn Project. The Sporn Project was chosen by the Department of Energy for funding under the Innovative Clean Coal Technology Program. According to Asea Babcock, construction of the PFBC plant would begin in early 1993 with initial operation scheduled for late 1995. Asea Babcock said the 330-MW project will be the largest PFBC plant ordered to date in the world.

More SCADA system orders for Landis & Gyr

The Tennessee Valley Authority recently purchased four supervisory control and data acquisition (SCADA) systems from Landis & Gyr, to control operations at seven hydroelectric generating plants in remote locations in the Appalachian Mountains. Landis & Gyr also reported sales of one SCADA system each to: Jefferson Davis Electrical Cooperative, Inc. of Louisiana; the Indiana Municipal Power Agency; and the city of Alexandria, LA.

In This Issue

Industry News

Merger Mania:
SCEcorp provokes dropped deal between SDG&E and TEP. 1
PacifiCorp/UP&L deal rests on conditions. 1
State regulators are asked: who'll risk a major plant order? 3
PSNH files reorganization plan in bankruptcy proceeding. 3
Power Gen '88, the first annual technical conference and exposition for generation managers and engineers, begins on Dec. 6. Here, a group of session chairman discusses technology trends. 17
EL&P's 1989 Calendar of Events can be found opposite page... 24

T&D Technology

Programmable controllers are cautiously being moved into substations. 31
Maintenance of distribution lines is simplified with a computer system. 35
Snohomish County PUD monitors customer heat loads with a small, dual-meter system. 37

Generation Technology

Spare parts access network can cut operating and maintenance costs. 26
SCE improves switchgear circuit breaker protection. 27
U.S. waste-to-energy plants, now at 111, have great growth potential. 28
Development incentives may overpower disadvantages for waste-to-energy projects. 28
Refuse-derived-fuel fires modified coal boilers. 29

Regular Features

Commentary 4
Letters 4
Exhibitor Bulletin Board 22
Calendar 25
Rate Activity 39
Information/Control Systems 40
New Products 43
Readers' Service 45
Financial Performances 50
Bulletin Board 51
Regulatory Review 56
Management Methods 57

USCEA gave a party but almost nobody came

Ever go to a party, and find that the guest of honor didn't show up? Or more to the point, ever *give* a party where nobody showed up? If you have, then you can understand the mood at the recent Nuclear Energy Forum, held in Washington, DC, in early November.

The Nuclear Energy Forum, for the benefit of *EL&P* readers who do not follow developments in the power generation arena, is sponsored by the U.S. Committee for Energy Awareness, the successor to what used to be called the Atomic Industrial Forum. The annual fall conference has been held for years in conjunction with the fall meeting of the American Nuclear Society, alternating years in Washington, DC, and on the west coast, usually San Francisco.

One of the pains that results from being a long-time reporter and observer of industry activities is remembering and comparing events. I especially recall one of my first AIF meetings, held in Miami Beach back in '71 or '72, I believe. It was some wingding! Eight hundred to a thousand or more crowded the meeting room, special presentations, fancy receptions, dinners, scheduled press conferences competing for editors and reporters' time. A far cry from this year's get-together!

Granted, nobody in the know would expect a nuclear industry conference or convention today to match up with those from the golden days of nuclear power development. But I can't believe anybody expected the gaunt, emaciated appearance of the nuclear industry that confronted this year's meeting.

The first session was held in conjunction with ANS at the ANS' hotel. Attendance was good, though not huge. But then the Nuclear Energy Forum meetings shifted back to the USCEA's hotel, and the true condition of the industry became apparent.

The AIF's annual fall get-togethers used to be attended by utility, manufacturer, architect-engineer and government executives. Chairmen, presidents and vice presidents crowded together with nuclear engineers and managers, sales and marketing types, and government officials. There were lots of young, enthusiastic faces in the crowd. But no longer!

This year the ballroom where the NEF meetings were held was chopped down by a movable wall, and surrounded by a semicircular balcony that further reduced usable floor space. About 56 round dinner tables, large enough to accommodate 10 each, were positioned in front of the speaker's platform. A few tables had three registrants seated at them, but most had one or two. Most tables around the edge of the truncated room were unoccupied. For that first session at USCEA's hotel, I estimated about 150 people at the beginning, but toward the end, a Washington reporter counted the heads and got just 84. In the morning session two days later I counted less than 70. Few of these were what could be considered young.

While USCEA staff and many speakers tried to sound optimistic, there was little real enthusiasm. Most of the conference focused on the continuing growth of nuclear power in Europe and Asia and the severe problems throttling the industry here in the U.S.

There were no realistic solutions offered for the near term. None of the speakers or NEF officials held out any hope for even midterm recovery for the nuclear power industry. Long term, perhaps, a major series of electrical catastrophies could open the door for future development. The more optimistic held out hope of some new nuclear orders in the early years of the next century.

In the meantime, we can expect the number of surviving members of the nuclear equipment manufacturing industry to decrease. For many, time is running out. One can only wonder if there will be a U.S. nuclear industry capable of building the next generation of nuclear plants *if and when* the time comes that utilities, or other potential generators, are ready to order a new nuclear unit.

A couple of more years of decline and the NEF could be held in the back room of any of a number of Washington watering holes. It's hard to envision this as the nucleus of the long-term salvation of the electric industry.

Robert A. Lincicome, Editor-in-Chief

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Operator fines

The commentary in September's issue on shared responsibility between utilities and individual employees for improper actions ("NRC's penalty policy takes a turn," p.4), was correct as far as it went.

However, in a case like that of shiftworkers sleeping at the Peach Bottom nuclear facility it would seem that the employees' labor union should also be held accountable along with the employer.

When unions are called to answer for their members' transgressions, we will start to see a little more common sense and realism at the bargaining table.

R.Jeustime
Florida Power & Light Co.
St. Lucie Nuclear Plant
Jensen Beach, FL

Prudence review complexity challenges utility plant

Ivor Samson
Marron, Reid & Sheehy

SAN FRANCISCO—The "regulatory compact" that had, in effect, guaranteed public utilities a fair rate of return in exchange for their obligation to provide secure service to an ever-growing demand, in many cases, disintegrated.

This dramatic change was seen in the events that would have been unthinkable only a few years ago, such as the potential bankruptcy of Public Service Company of New Hampshire, the Washington Public Power Supply bond failure and the spectre hanging over Long Island Lighting Company as a result of the Shoreham debacle.

This disintegration has been caused by the rise of consumerism, falling demand for electricity, rapidly changing fuel prices, competition within service territories, and new sources of energy, all within a general framework of deregulation in an age of uncertainty.

A major change in the regulatory process is the "prudence review," an "after-the-fact" evaluation of management decisions and processes, generally conducted in order to determine what capital costs or operating expenses should be passed on to ratepayers. It's Monday morning quarterbacking with billions of dollars at stake.

The post-hoc regulatory review of individual management decisions, once rare, is now becoming increasingly common. The issue is most often raised in ratemaking proceedings, either to recover operating expenses or to place new capital facilities into rate base. Generally, only expenses that are "reasonably and prudently incurred" can be recovered through rates or included in rate base. In order to determine what expenses were reasonably incurred, public utility commissions, staffs and intervenors have increasingly tended to focus upon the adequacy of management's decision-making processes and the ultimate correctness of individual management decisions.

Not only for new plant

These "prudence reviews" have investigated such diverse areas as fuel procurement practices, plant performance and plant outage practices, and generation planning methods. Amounts disallowed have ranged from several million dollars for improper maintenance procedures to $1.4 billion for imprudent construction and management practices at the Shoreham nuclear plant.

They will undoubtedly become the focus of regulations in "deregulated" natural-gas markets, where state utility commissions will conduct after-the-fact evaluations of the fuel procurement practices of distribution utilities.

But nowhere has the inquiry been as intense or the development of methodology and standards so rigorous as in the retrospective review of power plant construction costs—especially these involving nuclear power plants.

To date, there have been over two dozen prudence reviews of nuclear power plants. Because of the complexity and magnitude of these reviews, certain criteria and practices have evolved which are equally applicable to, *and will eventually be applied to*, virtually every aspect of a regulated utility's business.

The tremendous increases in cost, allegations of management imprudence, schedule extensions, etc., that have often been associated with nuclear plants in the public's mind, have resulted in them, as a class, being the first focus of public utility commission-directed reviews. But this is a short-term phenomenon; when the management of the construction of the last nuclear plant has been reviewed, the concept of a comprehensive prudence review of management decisions as a regulatory tool will still be here to stay.

A prudence review, or reasonableness review, is a comprehensive, systematic analysis of both the outcome of a particular project or management action and of the management decisions and the processes that underlie that project or action. In the case of large power plants, where construction stretches over many years and involves thousands of separate decisions, a prudence review can be a tremendous undertaking involving hundreds of people and thousands or even millions of documents.

In other cases the numbers may be smaller but the intensity of focus on specific issues may be that much greater. In every case, the after-the-fact prudence review is changing the way in which utilities make decisions and conduct business.

The following general guidelines have evolved primarily from reviews of nuclear construction projects but are generally applicable to other aspects of management review:

The "reasonable man standard" is the measure by which prudent conduct is determined. In the recent San Onofre decision, the California Public Utilities Commission articulated this standard as meaning that "...the utilities' actions should comport with what a reasonable manager of sufficient education, training, experience and skills, using the tools and knowledge at his disposal, would do when faced with a need to make a decision and act."

Prudence can only be objectively assessed by evaluating management decision-making in the context of what was known or reasonably knowable at the time of the decision. Prudence does not require prescience.

Decision not viewed

No management decision is made in a vacuum. Specific inquiry into narrow areas of decision-making must recognize that a larger corporate purpose might have been served by an apparently sub-optimal choice in the study area, e.g., not allocating sufficient personal

Continued on page 6

U.S. waste-to-energy: A status report

Jonathan V.L. Kiser
Research Analyst
Institute of Resource Recovery, NSWMA

Focus On Waste to Energy

Utilities' primary interest in waste-to-energy is energy production—electricity and/or steam. Government officials see a more central purpose—environmentally sound garbage disposal.

Energy sales from such plants help offset operating and maintenance costs and minimizes the "tipping fees" charged to facility users, those hauling the garbage.

More than 11,600 tons per day, or more than 230 MW, of additional waste-to-energy plant capacity became operational in 1987, according Kidder, Peabody & Co., in their Dec. 31, 1987, *Status Report on Resource Recovery*. This marked more than a 100-percent increase over 1986 new capacity, and translates to an average of 20 MW per 1000 tons per day of garbage processed. The conversion varies with factors such as system technology, waste-stream characteristics and operating conditions.

A few utilities have entered waste-to-energy industry by planning, owning or operating such plants themselves; others are involved only by purchasing the power the plants produce. Potential for waste-to-energy growth increases with dwindling landfill capacity.

Facility ownership and operation

Ownership and operation of waste-to-energy facilities are divided among private firms, including utilities, and public or governmental entities. A recent Governmental Advisory Associates (GAA) survey polled representatives at 111 existing waste-to-energy plants and an additional 91 communities planning to implement facilities. See the table for a summary of ownership and operation.

Industry representatives expect development of new waste-to-energy projects to slow during the next several years because of local opposition to such plants. Over the next decade, however, growth is predicted. Approximately 10 percent of U.S. refuse is burned now, according to U.S. Environmental Protection Agency figures. Michael Flynn, EPA's acting chief of Special Wastes Branch, forecasts that this figure will increase to 16 percent by the year 2000.

Waste-to-energy plants can reduce garbage 90 percent by volume and 70 percent by weight to help preserve landfill capacity. The added benefits of providing steam, electricity, and, in some plants, recycled resources, make waste-to-energy an attractive alternative, despite siting challenges, and regulatory and congressional concerns about emissions and ash disposal.

Incineration plants go way back

Garbage burning is a centuries-old practice. In the late 19th century, simple brick chambers began to emerge, offering a more-controlled approach than open burning. Over time, mass-burn incineration plants became widely used, first in Europe and then in the United States.

As of 1966, nearly 300 U.S. incineration plants were operating, capable of burning approximately 30-million tons of refuse annually, according to Robert Brickner, senior vice president with Gershman, Brickner & Bratton Inc., solid-waste management consultants of Falls Church, VA. Most facilities were shut down due to noncompliance with EPA air-emissions standards.

During the early 1970s, some 14 waste-to-energy facilities that differed significantly in design and function from the old-fashioned incinerators were built. The early 1980s fueled additional growth, in response to greater waste-management demands, rising fossil-fuel prices, tax incentives, and the passage of the Public Utilities Regulatory Policies Act of 1978.

From 1980 to 1984, 42 facilities began operating, according to GAA, which is based in New York, NY. From 1985 to the present, an additional 53 came on-line.

Unlike the early incinerators, today's waste-to-energy facilities meet, and often exceed, pollution-control requirements in the following ways:

- High-temperature combustion temperatures (1800-2200 F) break down complex chemical compounds into simpler, less harmful components.
- The best available control technologies (BACT) capture and remove more than 95 percent of the remaining gases and fly ash. These technologies include acid-gas scrubbers, electrostatic precipitators and fabric filters.
- Continuous emissions monitoring (CEM) tracks the level of specified air pollutants and operating conditions and helps achieve optimal combustion

Continued on page 29

Outlook brightens for power from waste-to-energy plants

Focus On Waste to Energy

Increasingly, waste-to-energy plants are becoming part of utilities' generating mix. The number of plants have grown due to society's need for reduced solid-waste stream, current PURPA law and proposed changes, bidding guidelines, and technological advances.

Over the next decade, utilities will be scrambling to add generation as demand growth outpaces capacity increases, reducing reserves. At the same time, states, counties and municipalities will find landfill sites limited, while the need for such sites increases.

These would seem problems with complementary solutions, that is: burn the growing amounts of waste to provide needed additional generating capacity for utility use.

From an economic viewpoint alone, however, waste cannot yet compete with other fuels in most regions. But as the cost of waste disposal becomes greater, and as emission-control, trash-handling, plant operation, and disposal technologies advance, then the economic viability of waste-to-energy facilities seems sure to improve.

In some areas, though, regulators, governmental bodies and/or utilities now include substantial non-price incentives in their deliberations of waste-to-energy plants or when setting criteria for bidding guidelines.

These factors facilitate the use of such systems, and other refuse-reduction methods, in solving society's impending waste-management crisis.

Power sales from cogenerators, independent power producers, municipalities or counties may serve to introduce utilities to waste-to-energy facilities and their first waste-generated power.

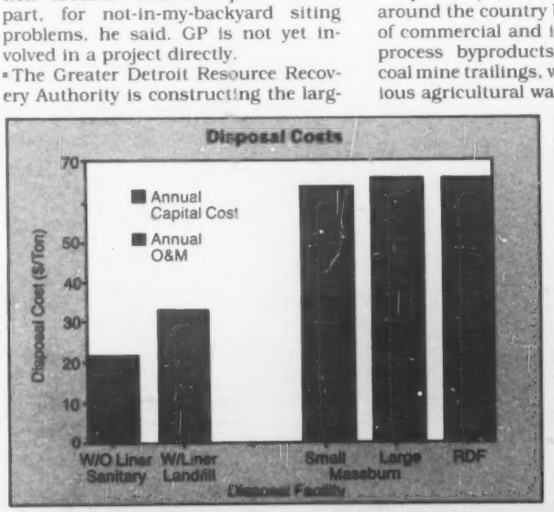
As incentives for development increase, more utilities may consider direct involvement. Some recent activity includes:

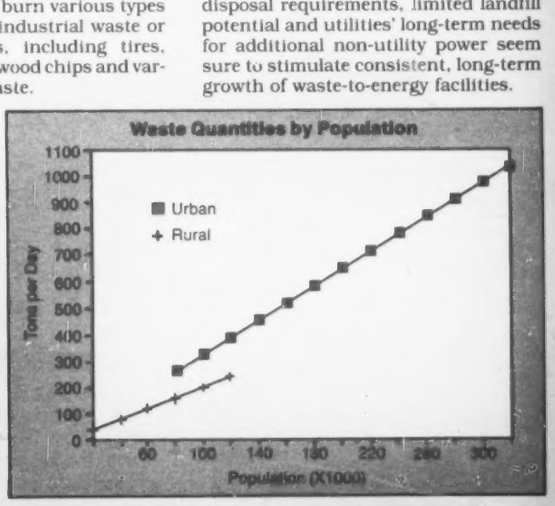
- Northern States Power Co., prompted by state laws on waste-stream reduction, has undertaken a number of projects.
- Georgia Power Co., to help communities with long-range waste planning, published "A Guide to Solid Waste Disposal Options." Lyman Shivers, a GP marketing staff engineer, said there's a considerable amount of misinformation around. That's responsible, in part, for not-in-my-backyard siting problems, he said. GP is not yet involved in a project directly.
- The Greater Detroit Resource Recovery Authority is constructing the largest U.S. waste-to-energy plant so far, a 3300-tons-per-day facility to be finished next year. It will generate steam for the downtown loop and sell up to 68 MW to Detroit Edison Co.

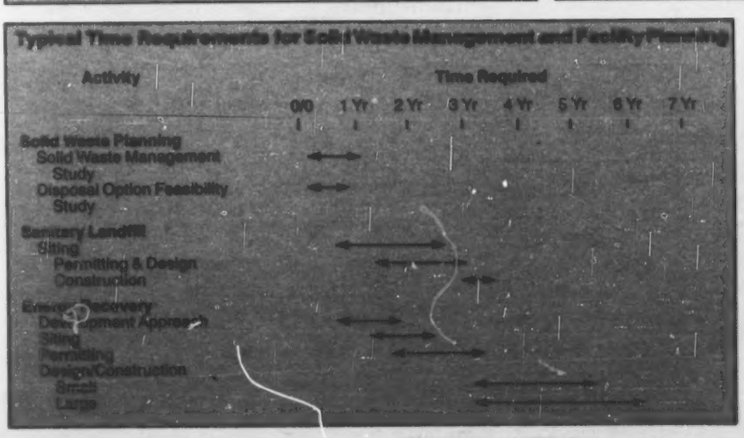
Other utilities are co-firing up to 15 percent refuse-derived fuel (RDF) with coal. These include, among others, Baltimore Gas & Electric Co., New England Electric System, United Illuminating and Madison Gas & Electric Co.

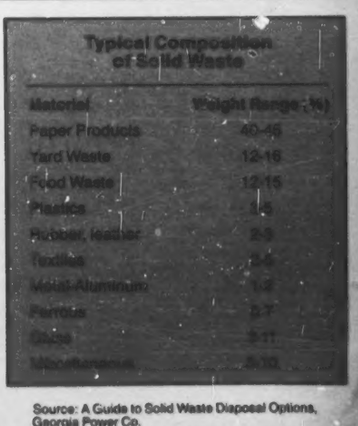
Specialty waste-burning plants around the country burn various types of commercial and industrial waste or process byproducts, including tires, coal mine trailings, wood chips and various agricultural waste.

More stringent air-emissions and ash-disposal legislation could challenge the pace of development. Nevertheless, increasingly pressing municipal waste-disposal requirements, limited landfill potential and utilities' long-term needs for additional non-utility power seem sure to stimulate consistent, long-term growth of waste-to-energy facilities.









Source: A Guide to Solid Waste Disposal Options, Georgia Power Co.

Conversion lets coal-fired station take trash

Peter Schueler
Babcock & Wilcox

United Power Association (UPA) is converting its 50-MW, three-unit Elk River steam generating station to burn refuse-derived fuel (RDF). The new 31-MW station in Minnesota will be fueled from an off-site waste processing plant owned and operated by Northern States Power Co. The power plant was constructed in the early 1950s.

This conversion, and 11 other waste-to-energy plants, when completed, will handle half of Minnesota's municipal solid waste. This construction was encouraged by the state's 1980 Waste Management Act, and subsequent amendments. These require that a comprehensive waste-management plan accompany permit applications for new mixed municipal solid-waste landfills, to reduce landfill volume.

That mandate, and the resulting four-to-five-fold increase in tipping fees, caused a major move towards waste-to-energy facilities.

The newly converted plant will burn up to 1050 tons of RDF per day. The installation is similar to those completed by NSP at its Red Wing and Wilmarth (MN) stations.

NSP has joined with UPA in this project and has built, and will operate, a separate RDF-preparation plant to process the fuel for Elk River. In such plants, most non-combustible items are separated, some for recycling. The remaining shredded fluff, mostly plastic and paper, is trucked to the RDF-burning plants.

One of the most challenging and critical elements of the project is conversion/modification of the three boilers to burn all types of RDF. Differences in fuel handling, combustion temperature, Btu output, and emissions necessitate such conversions.

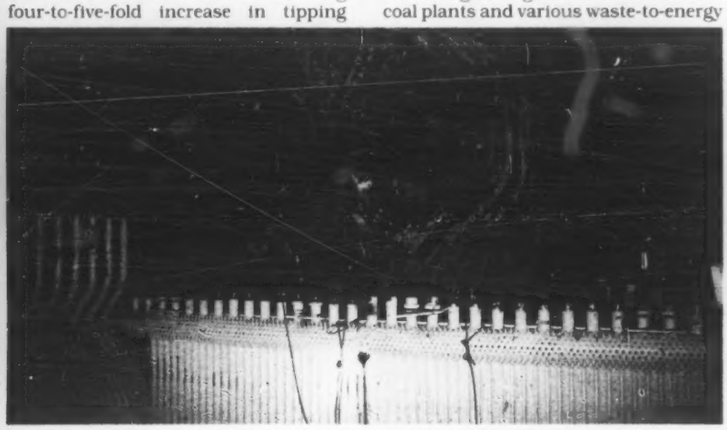
Although design differences between coal plants and various waste-to-energy plants vary across the industry, B&W's latest RDF technology illustrates the types of changes generally necessary.

Originally Elk River Units 1 and 2 were stoker coal-fired boilers designed to produce 120,000 pph steam, producing 12.5 MW each. These modifications are expected to yield 86,300 pph steam, about 8.2 MW each.

Additional furnace volume was needed to maximize RDF throughput. New stokers were located 10.5 ft below their original position, thus extending the original furnace height.

The new furnace extension is a membrane-wall-type construction with an RDF-designed, overfire air system built in. Even with the furnace enlargement, steam conditions have been reduced to a level consistent with RDF firing standards. Coal firing volumetric liberation rates—the measuring time available for fuel burn—were 16,330-22,300 Btu/cu ft/hr, but RDF firing liberation rates normally run around 14,550 Btu/cu ft/hr. For coal firing the exit gas temperature was 2000 F, but for RDF it is about 1600 F.

New primary and secondary superheaters are designed to minimize the corrosive effects of RDF firing. The original generating-bank gas baffles were modified to reduce gas velocities, erosion and plugging potentials, typically a problem in all W-to-E plants. To cut flue-gas velocity to about 30 ft/sec in the original economizer, 8 of 22 economizer sections were removed.



Waste-to-energy boilers can require more furnace volume than coal-fired boilers. In this conversion of a coal boiler, new stokers are 10.5 ft below their original position. The lower membrane wall meets the original upper furnace tube and tile. Note the original burner throats for auxiliary gas firing.

Elk River Performance Data

Units 1 and 2 (Each)

	Original Design	Modified
Fuel	Coal	RDF
Steam Flow, lb/hr	120,000	86,300
Steam Temperature, F	830	750
Steam Pressure, psig	615	615
Fuel Flow, tons/day	152.4	280
Excess Air, percent	30	70
Gross Generation, MW	12.5	8.2

Unit 3

	Original Design	Modified
Fuel	Coal	RDF
Steam Flow, lb/hr	215,000	173,600
Steam Temperature, F	905	750
Steam Pressure, psig	875	615
Fuel Flow, tons/day	265.2	565
Excess Air, percent	22	70
Gross Generation, MW	25.0	18.5

Focus On Waste to Energy

Unit 3 burned pulverized coal

Unit 3, originally a pulverized-coal-fired boiler, produced 215,000 pph steam at 875 psig and 905 F, producing 25 MW. Unit 3 is expected to produce 18.5 MW upon completion. Net plant output after redesign is an estimated 31 MW.

As with Units 1 and 2, the steam conditions have been reduced for RDF firing. A new lower furnace using membrane-wall construction replaced the original hopper bottom. The modified furnace is fitted with a new stoker and an overfire-air system similar to those on Units 1 and 2.

The boiler screen and arch were modified to accommodate a secondary superheater designed for RDF firing. Every other section of the existing primary superheater was removed to increase the clear-side spacing and reduce potential plugging. Retractable sootblowers were added to the secondary superheater cavity.

Continued on page 30

from page 28

Waste to energy...

while assuring proper operation of the air-pollution-control equipment.

Waste-to-energy technologies

Waste-to-energy technologies are divided into three broad categories: mass burn, refuse-derived fuel (RDF) and modular units.

Mass-burn plants receive mixed garbage from hauling vehicles (often after community recycling efforts have taken place). Garbage is typically dumped into a storage pit and deposited by crane into a feed hopper.

The garbage moves down a grate as it burns; combustion gases are generated, heating the furnace walls and boiler heat exchangers. Combustion gases then pass through air-pollution-control equipment before entering the atmosphere.

RDF plants differ in that refuse is first routed through a series of conveyors, shredders, screens and separators. Recyclable and noncombustible materials are removed in the process. The remaining material is a uniform fuel (mostly paper and plastic) with a higher heating value than mixed garbage. It can be burned in a dedicated plant or, with some plant modifications, co-fired with coal in some boilers.

Modular facilities are similar to mass-burn plants but smaller in size. As a result, modular units are usually shop fabricated.

Emerging disposal guidelines

Waste-to-energy plants generate two types of ash. Bottom ash is removed from beneath the combustion chamber and fly ash from the pollution-control devices. They are typically mixed together and disposed of in sanitary landfills.

Disposal requirements for such materials are becoming increasingly stringent to ensure groundwater protection. Technical guidelines considered by 100th Congress and the EPA call for ash disposal in land facilities equipped with, at minimum, leachate collection and liner systems. The EPA recommends certain design standards and also specific operating controls, closure and post-closure requirements, groundwater monitoring, and corrective-action guidelines, as well as meeting any additional local standards.

Clear need, despite opposition

A recent EPA report points out that Americans are generating more garbage each year while available landfill capacity is diminishing. At the same time, other management alternatives are slow to meet increasing demand. For example, the EPA says just 10 percent of the waste stream is recycled.

Even if the U.S. is able to achieve a nationwide recycling level of 40 percent by 2000, about 75 percent of the waste stream (as measured in 1984) would remain, according to Walter Shaub, technical director of the Coalition on Resource Recovery and Environment (CORRE). And that assumes that 100 percent of the recycled waste will be reutilitized, which is optimistic. These figures account for an annual increase in the garbage production rate of 1.3 percent starting in 1984.

No single approach will solve the growing garbage crisis. The key to an effective disposal system lies in developing an integrated waste-management program including waste reduction, recycling, waste-to-energy plants, and landfilling.

Clearly, the need for waste-to-energy projects will continue to grow.

Industry groups: IRR and NSWMA

The largest group of private owners and operators in the waste-to-energy field today is comprised of independent vendors who are members of the Institute of Resource Recovery (IRR), a component of the National Solid Wastes Management Association. IRR members currently have a total 72 projects in operation, under construction or in the planning stage. These projects have a combined design capacity of more than 98,500 tons per day (TPD). In addition, IRR members own approximately 60 percent of the projects they are involved with, and operate almost all of them.

IRR's members include: American REF-FUEL Co., Blount Energy Resource Corp., Combustion Engineering Inc., General Electric Co., Ogden Martin Systems Inc., Riley Energy Systems Corp., Waste Management Energy Systems Inc., Westinghouse Electric Corp. and Wheelabrator Environmental Systems Inc.

For more than 15 years, IRR has advocated waste-to-energy plants as an important part of waste-management strategies that also include waste reduction, recycling and landfilling. IRR members are waste-service firms specializing in recovering energy and materials from garbage while reducing its volume through combustion. NSWMA is some 2700 private, professional firms whose primary concern is the collection, transport, management and disposal of solid waste and refuse.